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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,319	03/31/2004	Xinhua Gu	IMRAA.025A	5170

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EXAMINER	
VAN ROY, TOD THOMAS	

ART UNIT	PAPER NUMBER
2828	

NOTIFICATION DATE	DELIVERY MODE
08/21/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/814,319	GU ET AL.	
	Examiner	Art Unit	
	TOD T. VAN ROY	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-6,9-41 and 55-76* is/are pending in the application.

4a) Of the above claim(s) *6,17,18,24,26,31-41 and 55-74* is/are withdrawn from consideration.

5)☒ Claim(s) *42-54* is/are allowed.

6)☒ Claim(s) *1-5,9-16,19-23,25,27-30,75-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/23/2008 has been entered.

Response to Amendment

The Examiner acknowledges the amending of claims 1-6 and 19-27 as well as the cancellation of claims 7-8 and addition of claims 75-76.

Response to Arguments

Applicant's arguments, see Remarks, filed 05/23/2008, with respect to the rejection(s) of claim(s) 12 under USC 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

The Examiner notes that it is not clear that Lin teaches an active adjustment of the variable attenuating device.

Applicant's arguments filed 05/23/2008 have been fully considered but they are not persuasive.

With respect to claims 1 and 9, the Applicant has argued that the combination of Lin and Price is non-obvious as the mode locking of Lin may not be improved and the oscillator may need redesign if said oscillator were external to the other system components as taught by Price.

The Examiner does not agree. Firstly, simply stating that the purpose of improved mode-locking would not be achieved without any explanation as to how or why this would occur is not found to be a convincing argument. The word "improved" is a relative term, and the Applicant has failed to state what kind of deleterious affect the modification of the system would have on this mode-locking feature.

The Applicant also has made mention that a redesign of the oscillator would be needed if it were external to the system. It seems obvious that some system component changes would need to be made to transition from an "internal" to an "external" oscillator setup. The Applicant has not made mention of just how significant a change he feels would be necessary. Therefor, the Examiner is of the opinion that the potential benefits of the external oscillator motivated by Price still exceed the changes noted by the Applicant without further clarification.

With respect to claims 19 and 27, the Applicant has repeated parts of the arguments responded to above, and in addition has argued that spectral filter limitations are not taught by Lin or Price.

The Examiner notes that the grating cited as the spectral filter acts as a filter by only reflecting a desired wavelength or wavelength range. Therefor the spectral bandwidth would be reduced via the attenuation of unwanted frequencies.

Please see updated rejections to amended claims below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5, 9-16, 19-23, 25, 27-30, and 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6570892) in view of Price et al. (US 6813429).

With respect to claim 1, Lin teaches an amplification system for outputting pulses having a duration and width comprising: a modelocked fiber oscillator outputting optical pulses (fig.4E #120), an amplifier (fig.4E #130) optically connected to said modelocked fiber oscillator to receive said optical pulses, said amplifier comprising a gain medium

that imparts gain to said optical pulses (inherent), and a variable attenuator (fig.4A #122) disposed between said modelocked fiber oscillator and said amplifier, said variable attenuator configured to receive said optical pulses from said mode-locked fiber oscillator prior to reaching said amplifier (not specified to be on the first pass) and having an adjustable transmission such that the amplitude of said optical pulses that are coupled from said modelocked fiber oscillator to said amplifier can be reduced (col.10 lines 5-15), and a compressor to compress the pulse to reduce the pulse width (col.11 lines 53-65), said compressor receiving amplified pulses from said amplifier (during additional passes), wherein said amplifier is configured such that attenuating said amplitude of the optical pulses coupled from said modelocked fiber oscillator to said amplifier reduces the pulse width at an output of said compressor (happening during multiple passes; as the entirety of the claimed instant invention is taught by Lin, it is inherent that the amplifier would operate accordingly). Lin does not teach the amplifier, variable attenuator, and compressor to be external to the fiber oscillator. Price teaches a similar pulsed fiber laser system wherein the modelocked fiber oscillator is external to the other system components (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the system of Lin with the external mode locked oscillator of Price in order to decouple the pulse source from the other system components to eliminate the need to make adjustments to the oscillator when changing overall system output characteristics such as power and tuning (Price, col.3 lines 7-15).

With respect to claims 2-4, Lin further teaches the use of a polarizing element (fig.4A #124).

With respect to claim 5, Lin teaches the polarization device outlined in the rejection of claims 2-4 above, but does not teach the device to be a waveplate. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization element of Lin with a waveplate having the same function as this optical element is well known and widely used in the art.

With respect to claim 9, Lin teaches a method of producing compressed laser pulses comprising, substantially modelocking (fig.4E #120) longitudinal modes of a laser cavity to repetitively produce a laser pulse, amplifying said laser pulse (fig.4E #130), chirping said laser pulse thereby changing the optical frequency of said optical pulse over time (inherent due to dispersive property of optical fibers), compressing said laser pulse by propagating different optical frequency components of said laser pulse differently to produce compressed laser pulses having a shortened temporal duration (soliton module, col.11 lines 53-65, inherently dispersive, formed of the fiber resonator), and selectively attenuating the amplitude of said laser pulse (fig.4A #122) prior to said amplifying of said laser pulse to further shorten said duration of said compressed laser pulses. Lin does not teach the amplifier, variable attenuator, and compressor to be downstream from the fiber oscillator. Price teaches a similar pulsed fiber laser system wherein the modelocked fiber oscillator is external, and upstream, to the other system components (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the system of Lin with the external mode locked

oscillator of Price in order to decouple the pulse source from the other system components to eliminate the need to make adjustments to the oscillator when changing overall system output characteristics such as power and tuning (Price, col.3 lines 7-15).

With respect to claims 10 and 14, Lin teaches the system outlined in the rejection to claims 9 and 12, but does not teach the specified attenuation, power, or duration values. It would have been obvious to adjust the system of Lin to obtain the stated values as a matter of routine optimization by one of ordinary skill in the art (see MPEP 2144.05 II A - "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235(CCPA 1955)).

With respect to claim 11, Lin teaches maintaining the polarization of the pulse after amplification (col.4 lines 58-66).

With respect to claim 12, Lin teaches a method of manufacturing a fiber laser comprising, modelocking a fiber based oscillator that outputs optical pulses (fig.4E #120), optically coupling an amplifier (fig.4E #130) to said fiber based oscillator through a variable attenuator (fig.4A #124) so as to feed said optical pulses from said fiber based oscillator through said variable attenuator and to said amplifier, and a variable attenuator to reduce the intensity of the optical pulses delivered to said amplifier (col.10 lines 5-8) and to shorten the pulse (see claim 1). Lin does not teach the amplifier, variable attenuator, and compressor to be downstream from the fiber oscillator or the variable attenuator to be varied based on pulse measurements. Price teaches a similar pulsed fiber laser system wherein the modelocked fiber oscillator is external, and

upstream, to the other system components (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the system of Lin with the external mode locked oscillator of Price in order to decouple the pulse source from the other system components to eliminate the need to make adjustments to the oscillator when changing overall system output characteristics such as power and tuning (Price, col.3 lines 7-15), as well as to vary the attenuator based on measurements to make use of feedback to make changes to the system parameters in real time.

With respect to claim 13, Lin teaches a pulse compressor to shorten the optical pulses (col.11 lines 53-65).

With respect to claims 15-16, Lin teaches the variable attenuator control outlined in the rejection to claim 12 above, but does not teach the control to be specifically based on either a power or pulse duration measurement. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the attenuator control of Lin with pulse duration or power measurement feedback in order to effect control over the system output as a whole.

With respect to claim 19, Lin teaches that described in the rejection to claim 1 above, and including the use of a spectral filter (fig.4E/F #110) disposed to receive said optical output of said modelocked fiber oscillator prior to reaching said amplifier (on the return trip from mirror #113, not claimed as being directly received from the modelocked oscillator, so is not limited to the first pass), said spectral filter having a spectral transmission with a band edge that overlaps said spectral power distribution of said optical output of said modelocked fiber oscillator to attenuate a portion of said spectral

power distribution and thereby reduce the spectral bandwidth (col.10 lines 44-51), the pulse width of said optical pulses coupled from said modelocked fiber oscillator to said fiber amplifier thereby being reduced. Lin does not teach the amplifier and filter to be external to the fiber oscillator. Price teaches a similar pulsed fiber laser system wherein the modelocked fiber oscillator is external to the other system components (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the system of Lin with the external mode locked oscillator of Price in order to decouple the pulse source from the other system components to eliminate the need to make adjustments to the oscillator when changing overall system output characteristics such as power and tuning (Price, col.3 lines 7-15).

With respect to claims 20-21, Lin teaches the use of a bandpass filter (col.10 lines 44-51).

With respect to claim 23, Lin teaches the use of a grating (fig.4E).

With respect to claims 22, 25, and 29-30, Lin teaches the filtering devices outlined in the rejections to claims 19 and 27 above, but does not teach a specific spectral bandwidth to be utilized. It would have been obvious to adjust the system of Lin to obtain the stated values as a matter of routine optimization by one of ordinary skill in the art (see MPEP 2144.05 II A - “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235(CCPA 1955)).

With respect to claims 27-28, Lin teaches the method of producing the optical pulses as outlined in the rejection to claim 19 above (see also claim 1 for the external components).

With respect to claims 75-76, Lin teaches an element that shortens the duration of said optical pulses (soliton module, col.11 lines 53-65, inherently dispersive, formed of the fiber resonator).

Allowable Subject Matter

Claims 42-54 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TOD T. VAN ROY whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TVR/

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828